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ABSTRACT

This report presents the results of two studies in the area of telecommunication for people with aphasia and mental retardation in Sweden. A brief outline of the use of still picture telephones for picture based distance communication is presented. Overall, still picture telephones were effective as a communication aid for people with either aphasia (N=15) or mental retardation. However, usage differences indicated people with aphasia used the telephone primarily to better communicate with their therapist whereas people with mental retardation used the telephone to establish and expand the social network and stimulate communication. (Contains 27 references.) (DB)

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STILL PICTURE TELEPHONES for people with Aphasia and Mental Retardation

Jane Brodin and Magnus Magnusson

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This report is written in the start-up process of the European RACE 2033 project (Research in Advanced Communications Technologies in Europe), TeleCommunity, which is financed by the Swedish Telecom and the Swedish National Board for Industrial and Technical Development (NUTEK).

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Abstract

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This report is a presentation of the results of two studies within the area of telecommunication for people with aphasia and mental retardation. A brief outline of the use of still picture telephones for picture based distance communication is presented.

Keywords: telecommunication, still picture telephones, mental retardation, aphasia, communication aid, augmentative and alternative communication (AAC)

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1. INTRODUCTION

1.1 Background.

Some years ago the Swedish Telecom started to expand the broadband network for telecommunication all over the country as many other national telecompanies all over the world. There is a plan to expand the cable network sometime around the turn of the century. The possibilities resulting from the spreading of broadband based technology will produce several technical applications using direct picture communication as an interactive communication tool. The technology, however, is still expensive and this is limiting a wide-spread use.

Text-based and interactive communication through telephone and computer networks has been available for several years through the use of information databases and BBS:s, i.e. Electronic Bulletin Board Systems and a lot of research has been conducted with regard to the use of this kind of system (Adriansson, 1987; Severinsson-Eklundh, 1986). Textbased systems for disabled people have also become widely used during the last decade (Lundman, 1991; Magnusson, 1991/2). Among most groups of disabled persons there is a growing awareness of the possibilities of high-tech and distance communication.

Picture communication is already available in the analogue network. However, on the market there are very few commercially available videophones with the capacity of high-quality picture transmission and the limitations of the narrow-band networks causes considerable problems with regard to development. Videoconferences on cable-networks and other Closed Circuit Tele-Vision systems (CCTV) have been used in certain cases, especially in distance education (Kristiansen, 1991).

New computer-based technology, has produced several technical applications using direct picture communication as an interactive communication tool at distance. The most known tool is the telefax, rapidly becoming used all over the world. A more interactive tool will be the videophone as soon as that technology will be commercially available in a broader sense. This new technology will surely change communication and interaction patterns for a lot of people, with or without disabilities.

Telematic in general will surely widen the possibility for a higher quality of life for people with special needs. Creative ideas for future development have been the foundation of several new projects during the last few years, projects of national as well as international importance (Lindström, 1987; Andersson, 1988).

It is easy to imagine the impact that picture-based distance communication would make when it is generally available. Among the groups that have realized the inherent possibilities of videotelephony are people with special needs, in other words, people with different disabilities as well as elderly people. Six groups of people have more than others realized that it is important to evaluate transmision of pictures as a support for distance communication (Frederiksen, 1989):

- Deaf people who communicate with sign language (Delvert, 1989)
- Hearing impaired people who communicate with signs and read facial gestures and lips
- Mentally retarded people who communicate with signs, symbols, pictures (Brodin & Björck-Åkesson, 1991; Pereira, 1991; Brodin & Magnusson, 1992)
- Speech impaired (dysarthric) persons who use signs, symbols and text to make themselves easier understood (von Tetzchner, 1991)
- Language impaired persons (dysphasic) who use signs, symbols and pictures to make themselves easier understood and to understand other persons better (Holand, 1991; Magnusson, 1991/2, 1992).
- People with Dyslexia

1.2. Aim of the report

The aim of this report is to give a brief outline of some evaluations made with people with Aphasia and Mental Retardation, using still picture telephones for picture based distance communication. The report is based on two empirical studies, which were presentated at the CSUN-conference "Technology and Disability", arranged at California State University at Northridge, March 1992. The focus of this report is on the empirical studies.

1.3 Technology.

Several technical applications and concepts will be introduced in this report, as follows:

Picture-communication = Any graphical method for communication, technological or non-technological.
Picture-based distance-communication = Any graphical method used over any sort of network or medium, including

- Telefax:
  Separate Telefax
  Faxmodem

- Picture Telephones:
  Stillpicture Telephone
  Videophone = Telephone for moving pictures transmission
- Personal computers with modems and graphical telecommunication software, for instance
  MacLink

Broad-band communication = communication via networks with a capacity for simultaneous multimedia communication with large amounts of information.

Narrow-band communication = communication through networks with less capacity.

This report will concentrate on the experiences and results of trials with Still Picture Telephones.

1.4 Description of Panasonic Still Picture Telephone

Only one type of telephone was used because only one was approved by the Swedish Telecom and available on the market. It was called Panasonic WG-R2 Visual Image Telecommunication Unit. The telephone was attachable to a common socket and functioned on the analogue network. To make a call it was necessary to dial the number on a common acoustic telephone first and also press the switch on the stillpicture telephone.

All the controls were placed on the front, to the right of the monochrome monitor measuring 4.5", excepting the focuser which was placed on the top. The camera-lens was placed at the top front, above the monitor. The telephone had, from the top and bottom eight push-button controls:

- repetition: The possibility to repeat pictures from the memory.
- freeze: Freeze and save up to six pictures in the memory to send or watch locally. The most recent picture automatically obliterates the oldest one.
- transmission: The button freezes and transmits the picture at the same time. It can
  also be used after freeze and then it transmits the previously frozen picture. The normal transmission speed is 10.2 sec/picture excluding sounds.

(The buttons above were larger and clearer because they were meant to be more frequently used).

- quick transmission: The possibility to diminish the picture and increase the transmission speed.

- video: Making it possible to get a picture from an external video camera.
- light 1: Raise the light.
- light 2: Lower the light
- on/off-button

On the back there were five connectors: video in, video out, AC/DC, wall outlet and telephone connector.

Comments:
The picture on the monitor is in black and white but does not show sharp contrast. It has considerable sensativity to lighten effects as well as distances from objects being transmitted. Its ability to focus is very limited. On the top of the phone there is a handle and underneath there is an adjustable stand which made it possible to regulate the angle of the phone.

2. STILL PICTURE TELEPHONES FOR PEOPLE WITH APHASIA.

2.1 Background.

People with aphasia is the most well-known and clearly defined category of people with language disorders. The resulting problems can be of impressive or expressive type. The main cause for aphasia is stroke. In Sweden about 5.000 persons per year get Aphasia. There are about 5.000 members in The Swedish Aphasia Society and the organization is working for optimal rehabilitation, including all stages of life for persons with aphasia. The organization has close cooperation with the phoniatric and logopedic experteeze in the field.

Aphasia rehabilitation in Sweden is divided into four different categories:
- individual or collective clinical therapy by speech therapists
- individual or collective courses at schools for adult education
- individual or collective occupational rehabilitational training
- evening courses at the local Aphasia association

All forms of rehabilitation are to be found all through Sweden, although the regional differences between available resources are very clear, especially between the densely populated southern and midland areas of Sweden and the more or less desolate areas far north. The communication network is extremely important in Sweden.

2.2 Technology and Aphasia.

In Sweden there is no established tradition of using technical aids in the Aphasia rehabilitation field. The methods used have mostly been oral or textual, in other words the use of pen, paper and pictures have been frequent. During the last 6 or seven years, however, developers and therapists, as well as aphasics themselves have discovered the possibilities of the microcomputer. Today in Scandinavia there are only about ten different computer programmes for Aphasia rehabilitation available (Kitzing & Apt, 1988; Magnusson, 1992). This implicates that there is a growing high tech awareness in the field at the moment.

2.3 Implications of Aphasia in daily living.

People with Aphasia experience a general loss of their language capacity, either on an expressive or an impressive level. This means that although the motor functions of the mouth or the throat are not impaired, the person with Aphasia will nonetheless have difficulties to speak or to understand spoken or written language, as words and concepts are not available in the mind of the person.

Aphasia is the result of a Stroke, caused by a damage or a lesion in the brain. It is often accompanied by motor deficits in that half of the body which is controlled by the damaged half of the brain, mostly the left hemisphere of the brain which means the right half of the body, causing hemipareses.

The work with Aphasia and distance-based picture-communication has been started by the Swedish Aphasia Society, financed by the Swedish Telecom and the National Inheritance fund and is also the start of a research project.

2.4 Aims of the project.

In 1991 the Swedish Aphasia Society evaluated picture-based distance technology as a means for communication for aphasics. They started a small pilot project for eight months between the first of september 1991 and the last of april 1992 with financial support from the Swedish Telecom. The project was divided into two parts:

- Part 1.: evaluation of still picture telephony
- Part 2.: evaluation of telefax communication

This report concentrates on Part 1. The second part will be reported separately.

The aims of the project were threefold:

- To obtain data for creating recommendations for the handling or prescriptionof still picture telephones as technical aids
- To develop and test new methods for picture-based communication at distance
- To establish a base for further research

The concrete situations to evaluate were:

- dyadic communication between individuals with Aphasia
- dyadic communication between a therapist or a teacher and a client with Aphasia
- dyadic communication between a relative and a client with Aphasia

The three different contexts sum up the most frequent situations of communication in the average aphasic.

2.5 Methods.

A total number of eight telephones were acquired. The project-leader kept one and one was left for demonstration purposes at the office of the Aphasia Society. The telephones were distributed two by two for a limited time. No evaluator was granted less than one month of testing time. Most participants had more time. In one instance the participants did not use all the time available. Unfortunately it was impossible to guarantee that those who wished to keep the phones after the project ended. This was due to lack of resources. The aim was to run at least one trial for each of the situations above.

A total number of 15 persons with Aphasia (about 50% male, 50% female) participated in the project. Most of them are at the moment living in the Stockholm area. The age difference ranges between 20 and 60 years. Several relatives and specialists have also participated. In one case only two aphasics participated. The project will be documented in two reports in Swedish and two in English, during the latter part of 1992.

As this was a pilot project the main findings expected from the trials were concerned with attitudes and reactions to technology on part of people involved. All participants were interviewed, directly or indirectly, based on a questionnaire especially developed for the project.

2.6 The empirical study

Eight still picture telephones were purchased, but the participants have been using their private telephones, except in one case where it was necessary to acquire a handsfree telephone because the participant found it to difficult to handle a common telephone.

An extra element in the evaluation was to discover if the physical distance between the interacting agents give due cause for using the Still Picture Telephone more readily in the north than in the south. In Norway they have investigated the problems of desolate areas and the need of distance based therapy more closely.

The telphones were distributed to the participants who kept them in their homes or at their rehabilitation centres during the trial period. Data from the trials were acquired mostly through interviews during and after the trials. As the aim of the project was to make a pilot study, no quantitative analysis of the data was made. The implications from the trials have been analyzed qualitatively and the results are used as a foundation for a larger and more general project on videotelephony for speech-impaired persons.

2.6 Some results and cases

Generally the technical features of the telephone did not cause any real problems for the participants. The commands and the functions were fairly easy to understand and so were the connecting of the p'one. The main problem was that several of the participants had some form of hemiparesis and needed handsfree-functions for their ordinary telephones. Some also wanted the telephone to be fastened to the surface beneath, to avoid dropping it on the floor.

Several participants experienced some problems regarding the relationship between the lamps and the camera lens of the telephone. Objects shown in front of the camera could not be too large to be clearly identifiable. The ideal scope of the camera seemed to be the face and the upper portion of a human body to make the picture detailed enough.

Results regarding the aspects of the problem concerning technical aids are to be included in a forthcoming report on this subject for aphasics. The report will be published in September by the Swedish Aphasia Society.

It has been possible to make investigations in all environments of rehabilitation except the vocational one. The cause is that few places in the country offer regular vocational rehabilitation courses. However, it has been possible to make tests for all the intended situations. One example for each of the different situations is stated below:

A therapeutical situation:

One telephone was placed in the room of a therapist and another in another room in the same building, where the client was located. Through a few calls it was established that it was possible to effectuate some of the easy trial and error practices with large and not too detailed pictures. It was, however, difficult to transmit written messages and the letters needed to be several inches large to make them clearly visible. Black and white Pictogram symbols, were easier to distinguish than letters. This could partly be a consequence of the Aphasia.

Neither the therapist nor the client really experinced the still-picture telephone as a serious alternative to the "live" situation nor to an imagined situation with a videophone with moving high quality colour pictures. Both parties experienced the lack of movement as damaging to the fluency of the therapeutical situation. From a technical point of view there was no problem to send or reieve a picture but the slow process of transmitting a still picture without the accompanying sound was experienced as a block. The participants wanted to stress that especially a therapeutical situation can be damaged by the intervention of technical media of for instance a videophone. On the other hand, participants agreed that it is important to make all types of telephone communication available to people with speech and language impairments.

An interactive situation between two persons with Aphasia:

Two ladies participating in one of the adult education courses courses borrowed one phone each during a fortnight to discover if it would alleviate their telephone calls with each other during that time. One of them had a very slight Aphasia with fluent speech and good verbal understanding. The other lady had a very good verbal understanding of spoken language and a fairly understandable agrammatical speech.

After the fortnight both persons where aware of the fact that they had no further use for the phone themselves. They experienced it as easy to handle and that the pictures where acceptable but for them it simply did not alleviate the interaction between themselves. They did not need the telephone to understand each other. On the other hand they were convinced that two persons with less fluent speech could have great use for the phone as a tool when words were lacking. They also experienced

the lack of movement as a factor that slowed the communication. They pointed out that the phone in reality was a kind of telefax communication.

An interactive situation between a client and a relative:

Two telephones were installed, one in the home of the client and one at the premises where the adult education courses were held. The client has no real speech of her own and normally uses pictures, Pictograms and gestures to communicate. She also has a hemipareses and is wheelchair-bound. During four months in use the still picture phone has become a natural extra aid when she is making calls between the school and her husband at home. She will probably begin vocational training within the next months and it is her wish to keep the telephone at work.

She and her husband are using the phone as a support in daily living. When she needs to explain something without words, she transmits a picture or a Pictogram. Even a pointing gesture of her intention then makes the interaction more effective. The lack of movement is not experienced as s problem for the interaction.

2.7 Discussion och conclusions

These brief cases tend to show that picture-based technology is experienced as a supportive tool, neither as a direct blocker nor as something totally unnecessary.

The two main negative experiences from the still picture telephone seems to be:

- that interaction becomes slower than necessary
- that lack of movement can limitate the content of the message

None of the participants experiences the visual component in the communication as anything but supportive. All the participating evaluators expressed a need for a videophone, that is a visual distance communication aid with moving pictures, sound and colour - i.e. direct interaction.

After the initial evaluation, the Aphasia Society will distribute some of the telephones to local associations and to individuals with aphasia who were interested to try the telephone on a time-limited basis. To start with, a few persons in the area of Stockholm and Umeå will be offered to borrow a stillpicture telephone for one year, as an extra tool in an evaluation project of a special communication computer program for persons with aphasia.

A project on videotelephony for speech-impaired people, including people with Aphasia will start in 1992 with financial support by the Swedish Telecom. The project will consist of two main parts:

- an investigation of the market (finished by december 1992)
- an evaluation of the technology

In future research it will be an aim to investigate what picture-based distance communication in reality means for making distance communication more like face-to-face communication, which in reality is to improve the quality of distance communication for speech impaired persons.

The investigation of still-picture telephony has showed that, despite limitations such as slowness and indirectness, visual support in distance communication gives quality and content in interaction for people with speech impairment.

3. STILL PICTURE TELEPHONES FOR PEOPLE WITH MENTAL RETARDATION

3.1 Background

There are about 38.000 people in Sweden, regarded as mentally retarded. People with mental retardation are people in need of special support for their daily living. In order to have access to services in the community and to be able to participate in social activities at 'normal' living conditions, people with mental retardation sometimes require more support than other groups of disabled people due to intellectual, cognitive, motor and social factors as well as the comprehension of additional handicaps. About 50% of this population also have multiple handicaps as motor disability, language and/or communication disorders, visual impairment and epilepsy, in addition to the mental retardation (Brodin, 1992). This makes the situation extremely complex.

Mental retardation is an intellectual disability caused by a brain damage and it has no connection with mental illness. The ability to understand what one sees, hears and experiences and to think in abstract terms is impaired or retarded in people with mental retardation. This is a psychological definition. The social definition includes that an individual who cannot meet the requirements in community, can be classified as mentally retarded from a social point of view. This means that the level of requirements of support and the adaption of the environment is crucial for

classifying people as mentally retarded.If the environment is adapted to the person with an impairment, he or she is not necessarily handicapped.

3.2 Implications of mental retardation in daily living

In order to define intellectual capacity it is necessary to understand the implications of mental retardation. The concept of reality is built up by processing sensorial experiences and is organized by the thought process. Symbols (pictures and language) are used to assist the thought process, but they are also important for communicative interaction with the environment. The function of the intellect is to organize the sensory impressions into the five concepts space, time, quality, quantity and cause, to make concrete and abstract thought operations and to symbolize objects and events. Structuring, operating and symbolizing can be performed at different abstraction levels.

People with mental retardation have the same feelings and needs as non-disabled people, but their self-esteem and self-confidence are influenced by the attitudes and treatment they receive from people in the environment (Kylén, 1981).

To conclude, a person with mental retardation has a lower capacity of the short time memory than is normally the case. This deteriorates the learning ability as well as the ability to perceive, to process and to store information. The abstraction level is lower than normal and the concept of reality is simple.

Speech and communication disorders are common. About 70% (Luftig, 1982) of all persons with mental retardation and 95% of persons with profound mental retardation have communication disorders (Brodin, 1991; Brodin & Lindberg, 1990).

3.3 Communication and telephoning

Technical development today seems to proceed ever faster, not least within the telecommunication area. During the eighties a number of devices that facilitate communication have been introduced on the market, for example automatic dialling and loudspeaking telephones. Access to telephone communication is by most people considered necessary for keeping in contact with the environment.

For many people with mental retardation it is difficult and complex to use a telephone. The communication ability depends on the individual's status (physical and psychological), on the environment's requirements and status (physical and social) and on the access to AAC (Augmentative and

Alternative Communication). Light (1989) has described communicative competence in terms of functional aspects, sufficiency and skills. Skills are divided into operational, linguistic, social and strategic aspects. When using a telephone all these aspects are involved. Four projects in the area of telecommunication are carried through at Stockholm University with financial support from the Swedish Telecom.

1. Evaluation of still picture telephones for children and adults with moderate mental retardation (1.5.90-1.5.91). A report has been published (Brodin & Björck-Åkesson, 1991).

2. Evaluation of still picture telephones for adults with profound mental retardation. The emotional and social aspects of communication are in focus (1.9.91-31.12.92).

3. Telefax communication for adults with moderate mental retardation. The persons attending to this project have a non-verbal communication and use Pictogram symbols in their daily living (1.9.91-31.12.92).

4. Videotelephony, transmission of moving pictures, at day care centers for adults with mental retardation at different levels of development. This is an international project with a collaboration beween nine European countries out of which four countries work in the area of mental retardation. The minitrial will start in September 1992 and the main study will start in January -93 (1.1.92-31.12.94).

3.4 Aim of the empirical studies

The overall aim is to find out if children, adolescents and adults with mental retardation can use and draw benefit from still picture telephones, videotelephones and telefax communication. The concrete questions are:

- Can transmission of pictures via the telecommunication network stimulate, facilitate and support communication?

- Can communication with pictures via the telenet contribute to increased potential for social contacts, thus enhancing the individual's quality of life?

- Can picture telephones and telefax be considered as individual communication aids for people with mental retardation?

3.5 Methods

To carry through the empirical studies open and semi-structured interviews, diaries, reports, and video recordings have been used. The steps of the projects have been: selection of persons and day care centers, descriptions of the persons in the project, reports and diary notes filled out by the staff, interviews with families and staff, transcription and analysis of video observations. The methods are described in details in the first report in the telecommunication field (Brodin & Björck-Åkesson, 1991).

3.6 Results

Certain factors are decisive for a functional use of the still picture telephone. These factors are:

- The user must have a real need for the still picture telephone.
- The initiative to call must come from the mentally retarded user and the calls must be natural.
- The user must have possibilities to call different persons and make his or her own choices.
- Positive experiences and continuity of use is important.

In conclusion, the still picture telephone has turned out to facilitate communication for people with mental retardation (Brodin & Björck-Åkesson, 1991). This conclusion is based on the fact that

- still picture telephone gives both visual and auditory information (two information channels are used)
- frequency, continuity and regularity to use the telephone increased successively in course of the project
- motivation, involvement and initiatives increased
- telephoning became more independant
- the pictures became more relevant and functional.

3.7 Conclusions

The above study has shown that the still picture telephone can contribute to increase the possibilites for social contacts and can be considered as a communication aid för people with mental retardation.

The goal of the Swedish handicap policy is to avoid special solutions for people with disabilities as far as possible and instead make society as a whole accessible to all citizens. The new technique offers many possibilities to facilitate the daily life and to give great opportunities for

development and independence provided that it is adapted and made available.

4. CONCLUDING REMARKS

To conclude, still picture telephones have turned out to be a good communication aid for people with aphasia as well as for people with mental retardation.

However, there is a difference in the use of the telephone. For people with aphasia, the most important way to use the telephone seems to be between a client and a therapist. For people with mental retardation the most important way to use the telephone seems to be to establish and expand the social network and to encourage and stimulate communication.

Few empirical studies have been conducted within this area and the studies presented in this report have limitations. First of all there is a limitation with regard to the number of participants, but also with regard to the project time. Longitudinal studies of the telecommunication habits would be of great interest in order to find out how still picture telephones could be used in the future in order to facilitate social integration in society. Will the still picture telephone for example be of help in the daily living?

Further research within the area of visual communication in general, distance communication and graphic communication via the telenet is needed.

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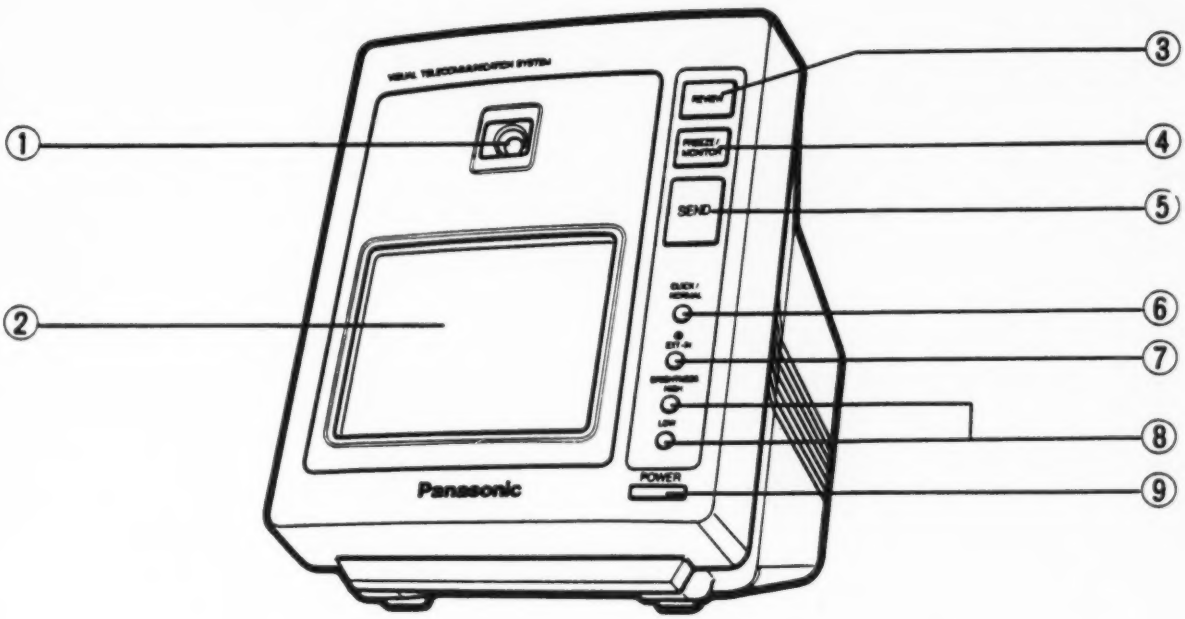
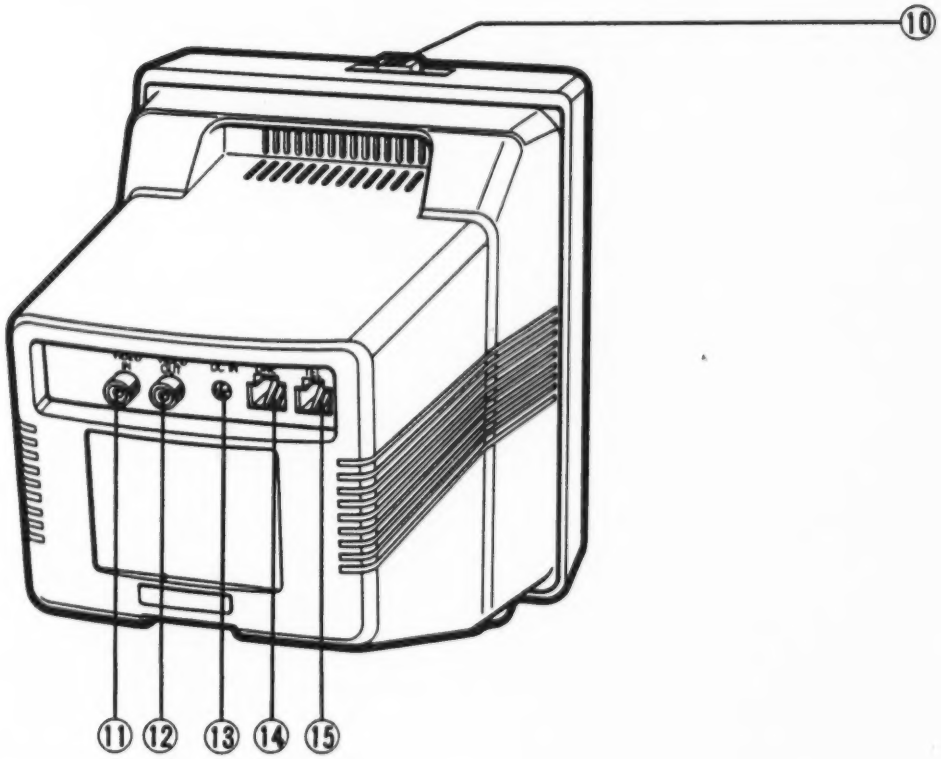
MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS





1 Camera Lens
Picks up the image and its focus is adjusted by sliding the Focus Adjuster, refer to item 10

2 Monitor Screen
The 4.5" monitor screen shows the image picked up by the camera and the still-image sent from your caller.

3 REVIEW Button (REVIEW)
Press this button to observe up to six still-pictures sent from your caller and memorized automatically in the order of transmission. The still-picture changes automatically in sequence while this button is being pressed. To resume live picture, press the FREEZE/MONITOR button, refer to item 4 .

4 FREEZE/MONITOR Button (FREEZE/MONITOR)
Press this button to freeze your live picture. Press again to resume the live picture.

5 SEND Button (SEND)
The still-picture or your live picture displayed on the monitor is sent to your caller when this button is pressed. A LED on the button blinks while the picture is being transmitted.

6 QUICK/NORMAL Button (QUICK/NORMAL)
The speed of transmission is set to approximately 10.2 or 6.5 seconds by pressing this button. When the high speed transmission is selected, the picture size of transmission will be a half of that in the normal speed.
Select this button while your live picture is being displayed on the monitor.

7 EXT IN Button (EXT IN)
Select the video picture of camera externally connected to the VIDEO IN connector, refer to item 11 . When the external video picture is selected, the LED lights on.

8 Brightness Buttons (BRIGHTNESS HIGH/LOW)
The brightness of your live camera picture is adjusted in 16 steps by pressing the HIGH or LOW brightness button.
The brightness changes when the button is being pressed.
The brightness level on the picture received from your caller cannot be adjusted by these buttons.

9 Power Switch (POWER)
Live picture appears when turning on the power switch. The memorized picture or pictures is backed up even in the power off.

10 Focus Adjuster (NORMAL/NEAR)
Allows you to adjust the focus to the Camera Lens (refer to item 1) for close-ups by sliding it.

11 VIDEO IN Connector (VIDEO IN)
The video signal from the external camera is connected to this connector by use of coaxial cable.

12 VIDEO OUT Connector (VIDEO OUT)
The video picture displayed on the monitor screen is reviewed or recorded by connecting an external video monitor or video tape recorder using coaxial cable.

13 DC IN Connector (DC IN)
The DC output plug from an AC adaptor is connected. The AC adaptor comes with the unit.

14 Line Connector (LINE)
Connects the telephone line cord having a modular type plug.

15 Telephone Connector (TEL)
Connects the line jack coming off telephone, use cord supplied with it.

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